

what is claimed is:

1. A food product, comprising:
  - a. microorganisms or extracted omega-3 HUFAs selected from the group consisting of Thraustochytriales, omega-3 HUFAs extracted from Thraustochytriales, and mixtures thereof; and
    - b. food material.
2. A food product, as claimed in Claim 1, wherein said food material is animal food.
3. A food product, as claimed in Claim 1, wherein said food material is human food.
4. A food product, as claimed in Claim 1, further comprising an antioxidant.
- C 5. A food product, as claimed in Claim 1, wherein the cells of the microorganisms are lysed to increase the bioavailability of omega-3 HUFAs contained therein.
6. A food product, as claimed in Claim 1, wherein said food product is packaged under non-oxidizing conditions.
- P 7. A food product, as claimed in Claim 1, wherein said food product is extruded.
- C 8. A food product, as claimed in Claim 1, wherein said group further consists of Thraustochytrium, Schizochytrium, omega-3 HUFAs extracted from Thraustochytrium, omega-3 HUFAs extracted from Schizochytrium, and mixtures thereof.
- publ. B1* > 9. A method of raising an animal, comprising feeding said animal microorganisms or extracted omega-3 HUFAs selected from the group consisting of Thraustochytriales, omega-3 HUFAs extracted from Thraustochytriales, and mixtures thereof in an amount effective to increase the content of omega-3 HUFAs in said animal.
- C 10. A food product, as claimed in Claim 9, wherein said group further consists of Thraustochytrium, Schizochytrium, omega-3 HUFAs extracted from

Thraustochytrium, omega-3 HUFAs extracted from Schizochytrium, and mixtures thereof.

11. An animal raised by the method as claimed in Claim 9.

12. A food product comprising the flesh of an animal, wherein said animal is raised by the method as claimed in Claim 9.

13. A food product, comprising an egg, wherein said egg is from poultry raised by the method as claimed in Claim 9.

14. A method, as claimed in Claim 9, wherein said animal is poultry.

15. A method, as claimed in Claim 14, wherein said animal is a chicken.

16. A method, as claimed in Claim 9, wherein said animal is cattle.

17. A method, as claimed in Claim 9, wherein said animal is seafood.

18. A method, as claimed in Claim 17, wherein said seafood is selected from the group consisting of fish, shrimp, shellfish, and mixtures thereof.

19. A method, as claimed in Claim 9, wherein said animal is swine.

20. A method of producing omega-3 HUFAs, comprising culturing Thraustochytriales in a medium comprising a source of organic carbon and a source of assimilable nitrogen.

21. A method, as claimed in Claim 20, wherein said Thraustochytriales are selected from the group consisting of Thraustochytrium, Schizochytrium, and mixtures thereof.

22. A method, as claimed in Claim 21, further comprising culturing said Thraustochytrium, Schizochytrium, or mixtures thereof under nutrient-limited conditions for an effective amount of time, preferably about 6 to 24 hours.

23. A method, as claimed in Claim 20, further comprising adding to said omega-3 HUFAs or said

Thraustochytriales during post-harvest processing of said omega-3 HUFAs or said Thraustochytriales a compound selected from the group consisting of BHT, BHA, TBHQ, ethoxyquin, beta-carotene, vitamin E and vitamin C.

24. A method, as claimed in Claim 20, wherein said culturing step further comprises/limiting the concentration in the medium of said source of assimilable nitrogen and harvesting said Thraustochytriales during said nitrogen limitation.

5 25. A method, as claimed in Claim 21, further comprising stressing said Thraustochytrium, Schizochytrium, or mixtures thereof with low temperatures during culturing.

26. A method, as claimed in Claim 20, further comprising maintaining a high dissolved oxygen concentration in said medium during culturing.

27. A method, as claimed in Claim 21, wherein said medium further comprises an effective amount of phosphorous to provide sustained growth of said Thraustochytrium, Schizochytrium, or mixtures thereof.

5 28. A method, as claimed in Claim 21, wherein said medium further comprises an effective amount of microbial growth factor to provide sustained growth of said Thraustochytrium, Schizochytrium, or mixtures thereof.

29. A method, as claimed in Claim 28, wherein said microbial growth factor comprises yeast extract.

30. A method, as claimed in Claim 28, wherein said microbial growth factor comprises corn steep liquor.

31. A method of producing omega-3 HUFAs, as claimed in Claim 20, further comprising extracting lipids from said Thraustochytriales.

32. A method, as claimed in Claim 31, further comprising fractional crystallization of the extracted lipids to separate omega-3 HUFAs therefrom.

33. A method, as claimed in Claim 32, wherein said fractional crystallization comprises the steps of:

a. rupturing microorganism cells to yield ruptured cells;

b. solvent extracting a lipid mixture from the ruptured cells;

5 c. hydrolyzing the lipid mixture;

d. cold-crystallizing non-HUFAs in said lipid mixture.

34. A method, as claimed in Claim 33, further comprising removing non-saponifiable compounds from said lipid mixture prior to said cold-crystallization.

35. A method, as claimed in Claim 20, wherein said carbon source and said nitrogen source comprise ground grain.

36. A method of producing omega-3 HUFAs, comprising culturing Thraustochytrium in a medium comprising ground grain.

37. A unicellular microorganism having the identifying characteristic of ATCC number 20888 and mutant strains derived therefrom.

38. A unicellular microorganism having the identifying characteristic of ATCC number 20889 and mutant strains derived therefrom.

39. A unicellular microorganism having the identifying characteristic of ATCC number 20890 and mutant strains derived therefrom.

40. A unicellular microorganism having the identifying characteristic of ATCC number 20891 and mutant strains derived therefrom.

41. A unicellular microorganism having the identifying characteristic of ATCC number 20892 and mutant strains derived therefrom.

42. A method for selecting unicellular, aquatic microorganisms capable of heterotrophic growth and capable of producing omega-3 HUFAs comprising the steps of:

5 a. selecting microorganisms of a size between about  $1\mu m$  and  $25\mu m$  from a sample population of microorganisms;

b. culturing said selected microorganisms in a medium comprising a source of organic carbon, assimilable nitrogen, assimilable phosphorous, and a microbial growth factor under heterotrophic conditions; and

c. selecting clear or white-colored non-filamentous colonies having rough or textured surfaces.

43. A method, as claimed in Claim 42, further comprising selecting orange or red-colored non-filamentous colonies having rough or textured surfaces.

44. A method, as claimed in Claim 42, wherein said sample population is collected from naturally occurring shallow saline habitats.

45. A method, as claimed in Claim 44, wherein said habitat is a saline warm spring along the Colorado River near Glenwood Springs, Colorado.

46. A method, as claimed in Claim 44, wherein said habitat is a saline warm spring on the western edge of the Stansbury Mountains, Utah.

47. A method, as claimed in Claim 44, wherein said habitat is the Tijuana estuary of San Diego County, California.

48. A method, as claimed in Claim 44, wherein said habitat is the Goshen playa near Goshen, Utah.

49. A method, as claimed in Claim 44, wherein said habitat is the marine tide pools in the Bird Rocks area of La Jolla, California.

50. A method for treating cardiovascular diseases, comprising introducing microorganisms or extracted omega-3 HUFAs selected from the group consisting of Thraustochytrium, Schizochytrium, omega-3 HUFAs extracted from Thraustochytrium, omega-3 HUFAs extracted from Schizochytrium, and mixtures thereof into a diet.

51. A method for treating inflammatory and/or immunological diseases, comprising introducing microorganisms or extracted omega-3 HUFAs selected from the group consisting of Thraustochytrium, Schizochytrium, omega-3 HUFAs extracted from

Thraustochytrium, omega-3 HUFAs extracted from Schizochytrium, and mixtures thereof into a diet.

52. A method for treating cancer, comprising introducing microorganisms or extracted omega-3 HUFAs selected from the group consisting of Thraustochytrium, Schizochytrium, omega-3 HUFAs extracted from Thraustochytrium, omega-3 HUFAs extracted from Schizochytrium, and mixtures thereof into a diet.